Chemical Composition of Dehydrated Buckwheat Meals and Extraction Residues

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RUTIN has been produced commercially from buckwheat by several different procedures (3, 4, 6, 8). At present, extraction of either fresh plant or dehydrated plant meal with hot organic solvents is preferred. By this procedure there are obtained several major waste products. These consist chiefly of the extracted plant residues (marcs) and the fatty material which separates out during concentration of solvent extracts. Mother liquors from crude rutin crystallization are a source of potassium nitrate, sugar and possibly other water soluble constituents. Also, the crude rutin itself contains certain unidentified minor constituents which are obtainable during its refining. This and several succeeding papers will describe studies on these by-products.

About 15 manufacturers are now engaged in the production of rutin, and it has been estimated (12) that about 50,000 acres of buckwheat must be cultivated in order to satisfy the potential yearly demand for rutin. This appears to indicate that there may develop a disposal problem not only for the buckwheat extraction residues but also for stems and low quality meals.

The Tartary variety is now preferred for either direct extraction of fresh buckwheat or for dehydration purposes since it is richer in rutin than the Japanese variety. (5)

Low quality meals result from use of improper drying conditions (6) or from the use of overly mature plant, when climatic conditions prevent harvesting at the proper time (2, 5). Further, the production of enriched leaf meal by the process of fractional dehydration and screening (6, 10) produces a large quantity of stems which have no value for rutin production. Since buckwheat meals are sold on a basis of rutin content with a premium for high rutin content, it is to the dehydrator's advantage to produce a leaf meal.

The leaves and blossoms, which comprise about 25-50% of the plant by weight contain most of the rutin; the stems contain only a small quantity. Furthermore, rutin is more easily extracted and refined from a meal of high quality than from one of poor quality (less than 2% rutin).

Although the immature buckwheat plant is used in many localities as a pasture supplement for cattle, no data are available in the literature on its chemical composition. To determine what possible use could be made of some of these products a variety of Japanese and Tartary buckwheat meals, leaf meals, stems and extraction residues were analyzed.

Discussion of Results

The samples of buckwheat meal, leaf meal and stems were obtained in the commercial market or produced at the laboratory during the pilot plant investigation of drying conditions (6).

The total dry matter, protein, fat, crude fiber, mineral matter, phosphorous, nitrogen, potassium and calcium were determined according to official methods (11). Carotene was determined by the method of Wall and Kelley (13), riboflavin by the method of Kelley (7) and crude rutin by the method of Naghski et al (9).

The data for these analyses are presented in the accompanying table. The compositions of alfalfa meal and leaf meal are included for comparison.

Buckwheat leaf meal compares favorably in protein, crude fiber, fat, alfalfa leaf meal. Its riboflavin content is about one half that of alfalfa. The whole meals appear low in protein compared to alfalfa and may not be satisfactory as feedstuff without blending with meal of higher protein content. Addition of supplements could be made to the marcs to restore nutrients lost in the extraction process.

No feeding data are available on the use of buckwheat meals, and these should be obtained in view of the potential supply. Buckwheat should be used with caution in the feeding of albino or white skinned animals because of the presence of photosensitizing agents (1).

The potassium and nitrogen content of the stems and marcs would make it worthwhile to return them to the soil as fertilizer for succeeding crops. This practice would help to maintain the organic matter of the soil.

Commercial utilization of stems would help to reduce the cost of producing buckwheat leaf meal, while utilization of the marcs would reduce the cost of rutin production.

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